

I claim:

1. Apparatus for controlling the delivery of air in a forced air distribution system having a source of air under pressure, at least one duct to deliver the air and at least  
5 one port in the duct defining an air delivery zone, comprising:

vent means associated with the at least one port and movable between an open position to admit air to the zone and a closed position to block air from the zone;

- 10 actuator means for moving the vent means between the open and closed positions; and

temperature sensing means in the air delivery zone in communication with the actuator means to control operation of the actuator means and the source of air under pressure.

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2. Apparatus as claimed in claim 1 in which the actuator means comprises a central control means remote from the vent means and an actuator unit at the vent means in communication with the central control means.

- 20 3. Apparatus as claimed in claim 2 including means communicating the actuator unit with the central control means which extend through the at least one duct.

4. Apparatus as claimed in claim 2 in which the vent means comprises:

- 25 a register unit insertable into the at least one port; and

valve means configurable to define the open and closed positions of the vent means to control the flow of air through the register unit.

- 30 5. Apparatus as claimed in claim 4 in which the register unit is removably insertable into the at least one port.

6. Apparatus as claimed in claim 4 in which the actuator unit comprises an electric motor to manipulate the valve means.
7. Apparatus as claimed in claim 6 in which the electric motor is reversible to  
5 configure the valve means between the open and closed positions.
8. Apparatus as claimed in claim 6 in which the electric motor is a one way unit to configure the valve means between one of the open and closed positions with a spring return to configure the valve means between the other of the open and closed  
10 positions.
9. Apparatus as claimed in claim 4 in which the actuator unit comprises a cylinder actuator to manipulate the valve means.
- 15 10. Apparatus as claimed in claim 9 in which the cylinder actuator is a double acting cylinder to configure the valve means between the open and closed positions.
11. Apparatus as claimed in claim 9 in which the cylinder actuator is a single acting cylinder to move the valve means between one of the open and closed positions  
20 with a spring return to configure the valve means between the other of the open and closed positions.
12. Apparatus as claimed in claim 9 in which the cylinder actuator is a pneumatic cylinder.  
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13. Apparatus as claimed in claim 9 in which the cylinder actuator is a hydraulic cylinder.
14. Apparatus as claimed in claim 4 in which the actuator comprises a solenoid  
30 actuator having a movable plunger to manipulate the valve means.
15. Apparatus as claimed in claim 14 in which the solenoid actuator includes a

ratchet mechanism to releasably lock the plunger in position.

16. Apparatus as claimed in claim 4 in which the actuator unit comprises a vacuum actuator.

5 17. Apparatus as claimed in claim 4 in which the valve means comprises first and second sets of vanes defining openings between the vanes, the first and second sets being movable with respect to each other by the actuator unit to align the openings to configure the vent means in the open position and to misalign the openings to configure the vent means in the closed position.

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18. Apparatus as claimed in claim 17 in which the first set of vanes is fixed and the second set is movable.

19. Apparatus as claimed in claim 4 in which the valve means comprises at least  
15 one plate pivotally mounted to the register, the at least one plate being pivotable by the actuator unit between a first position to configure the vent means in the open position and a second position to configure the vent means in the closed position.

20. Apparatus as claimed in claim 19 including sealing means on the plate and  
20 register that engage when the plate is pivoted to the second position.

21. Apparatus as claimed in claim 1 including an over pressure valve installable in the at least one duct.

25 22. Apparatus as claimed in claim 2 in which the temperature sensing means comprises a thermostat for transmitting the temperature to the central control means.

23. Apparatus as claimed in claim 22 in which the thermostat communicates with a wireless transmitter for transmitting the temperature to a wireless receiver at the  
30 central control means.

24. Apparatus as claimed in claim 22 in which the thermostat communicates with

the central control means via electrical lines.

25. Apparatus as claimed in claim 2 in which the actuator unit comprises a vacuum actuator and the central control means controls the vacuum actuator by a vacuum line extending through the at least one duct.

26. Apparatus as claimed in claim 25 in which the central control means includes:

a vacuum source;

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a switch to connect the vacuum line to or disconnect the vacuum line from the source of vacuum to operate the vacuum actuator.

27. Apparatus as claimed in claim 26 in which the switch comprises a solenoid having a plunger movable between a position to block the vacuum line to disconnect the actuator from the vacuum source and a position to open the vacuum line to connect the actuator to the vacuum source.

28. Apparatus as claimed in claim 26 including an additional switch to connect the vacuum line to atmospheric pressure on disconnection of the line from the source of vacuum in order to restore pressure in the vacuum line.

29. Apparatus as claimed 26 in which the vacuum line is restored to atmospheric pressure by leakage.

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30. Apparatus as claimed in claim 26 in which the central control means controls a plurality of actuators via a manifold having a central passage connected to the vacuum source, a plurality of ports connected by vacuum lines to the plurality of actuators, and a switch associated with each port for opening or closing the port for communication with the central passage to connect the vacuum line to the vacuum source.

31. Apparatus as claimed in claim 30 in which the switch comprise a solenoid

which acts to open or close the port for communication of the vacuum line with the central passage and the vacuum source.

32. Apparatus for controlling the delivery of air in a forced air distribution system
- 5 having a source of air under pressure, at least one duct to deliver the air and at least one port in the duct defining an air delivery zone, comprising, in combination:

a register unit having a valve associated with the at least one port, the valve being movable between an open position to admit air to the zone and a closed position to

10 block air from the zone;

an actuator unit for moving the valve between the open and closed positions;

a central control system remote from the register unit for controlling the actuator unit;

15 and

a thermostat in the air delivery zone for setting a desired temperature in the air delivery zone, the thermostat being in communication with the central control system to control the actuator unit and the source of air under pressure such that the valve

20 admits air to the zone and blocks air from the zone, in order to achieve said desired temperature.